



ANALYTICAL METHODOLOGY FOR GROUNDWATER AND SOIL ASSESSMENT GUIDELINES

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The analytical methodologies discussed in this document pertain to groundwater and soil analyses for petroleum related sites regulated under RCRA Subtitle I and the Pollution Control Act. All required analyses are to be performed by a laboratory certified by the South Carolina Department of Health and Environmental Control (SCDHEC) per State Regulation 61-81 for the appropriate EPA methodology. Deviations from the analytical methodology presented must be approved prior to use for compliance purposes. Questions concerning appropriate analytical methodology should be directed to the Division of Underground Storage Tank Management. The laboratory report for the analyses must include the S.C. Laboratory Identification Number for the laboratory performing the analyses. If analyses are subcontracted to another laboratory for analysis, the laboratory's S.C. Laboratory Identification Number must be documented beside the analyses performed by that laboratory.

Sampling Methodology

Sample containers, preservation techniques, and holding times for the required analyses for water and soil are addressed in Tables 1 and 2. Because of the major changes in the collection and analysis of low-level volatile organics, additional information appears below concerning the collection and the analysis of volatile organic compounds (BTEX).

Because of these changes, it is very important that you contact the analytical laboratory for the proper sample containers, chain-of-custody forms, and sample collection instructions prior to sampling for volatile organics. The new low-level volatile analysis will require increased coordination between the field personnel and laboratory personnel. When collecting the samples, the appropriate tools and sample collection devices must be available. For more information on sample collection procedures, refer to EPA Publication SW846, Third Edition, Updates I, II, IIA, and III, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods".

Volatile Organic Compounds (VOCs)

On June 13, 1997, SW846 was revised by Update III. Update III changed the soil collection and analysis procedures for volatile organic compounds (VOCs). The updated procedures are contained in SW846 (Update III) Methods 5030B and 5035. The revised RCRA methods (SW846, Update III) require different sampling and analysis procedures for samples having high concentrations of VOCs versus low concentrations of VOCs. Update III sample collection techniques are more complicated and tedious for volatile organic analysis than those in the previous update; however, the accuracy achieved by utilizing the Update III soil collection techniques warrant their use. Previous methodology has been shown to report significantly lower concentrations of VOCs in soil.

Method 5030B incorporates the analysis of aqueous samples, soils, and other solid samples with a high VOC

concentration (greater than 200 µg/kg) or a high concentration oily waste sample (greater than 200 µg/kg) using the conventional purge and trap apparatus. This procedure is used in conjunction with EPA Methods 8015B, 8021B, and 8260B.

Method 5035 describes the collection and analysis of low-level VOC solid samples (soils, sediment, and solid waste with VOC concentrations in the range of 0.5 to 200 µg/kg). The analysis consists of a closed system purge-and-trap method. Method 5035 utilizes a hermetically-sealed sample vial, the seal of which is never broken from the time of sampling to the time of analysis. Since the sample is never exposed to the atmosphere after sampling, the losses of VOCs during sample transport, handling, and analysis are negligible. The method also describes the procedures for collecting and preparing solid samples and oily wastes containing high concentrations of VOCs. This procedure is used in conjunction with EPA Methods 8015B, 8021B, and 8260B.

Method 5030B Ground-Water Sample Collection

Standard 40 mL glass screw-cap VOA vials with Teflon-lined silicone septa are to be used for collecting water samples for volatile analyses. Samples must always be collected in duplicate. The sample container needs to contain the necessary preservative and the water should be introduced into the vials slowly without introducing any air bubbles within the vial. The vials should be completely filled at the time of sampling, so that when the septum cap is fitted and sealed, and the vial inverted, no headspace is visible. The vial must not be opened prior to analysis to preserve its integrity. Immediately after collection, the sample vials must be labeled and stored at 4°C.

Method 5035 Solid Sample Collection

There are various options that can be used when collecting soil samples for low-level VOCs. As with any sampling procedure for volatiles, care must be taken to minimize the disturbance of the sample in order to minimize the loss of volatile components. Always wear gloves whenever handling the tared sample vials. Several techniques may be used to perform the transfer of the sample to the relatively narrow opening of the low concentration soil vial such as the Encore™ sampler, a cut off disposable plastic syringe, or a stainless steel spatula.

Encore™ Sample Collection:

The Encore™ sampler is both a sampler and a container for low-level soils. It is designed to collect an average weight with the exact weight to be determined in the lab. It is disposable and is also designed to have zero headspace. If the Encore™ sampler is used, the field personnel must get the sample to the laboratory within 48 hours of collection to preserve the sample.

A separate sample may need to be collected to enable the laboratory to perform a pretest on the soil to determine if the soil sample contains carbonate minerals that will effervesce upon contact with the acidic preservative solution in the low concentration sample vial. If the sample cannot be preserved with sodium bisulfate, the sample is then transferred to a preweighed vial with 5 mL of reagent water added to it. The

unpreserved sample in the vial must either be analyzed immediately or frozen within the 48 hour time frame. It still must be analyzed within the 14 day holding time. Extra samples must still be collected for high concentration analysis, screening, and moisture content.

Disposable Syringe Sample Collection:

If using the disposable plastic syringe, collect several trial samples with the plastic syringe and weigh each trial sample, noting the length of the soil column in the syringe. Use the data to determine the length of soil in the syringe that corresponds to 5.0 g. This can be done prior to going into the field to collect the samples, or if a portable balance is available this can be performed in the field. The sample is collected using the disposable syringe and put into a preweighed vial, provided by the laboratory, with the sample preservative and a stir bar. It is very important that the transfer of the sample be made as quickly as possible with very little disturbance to the soil to avoid loss of volatiles. The weight of the sample can be determined in the field and also determined in the laboratory.

A portable balance (capable of weighing to 0.01g) can be used to weigh the sealed vial containing the sample to ensure that approximately 5.0g of sample has been added to the vial, but this is optional. This weight determination if made in the field must be documented on the sample container and in the field records. If a portable balance is used, the balance calibration must be verified in the field using an appropriate weight for the sample containers employed. The appropriate reference weight must be used at least once daily prior to weighing any samples and records must be kept for the balance checks.

Stainless Steel Spatula Sample Collection:

The portable balance can also be used for weighing the preweighed vial and soil sample collected using a stainless steel spatula to ensure that 5.0 g of sample has been added to the vial. This sample collection technique is not recommended since the transfer and weighing of the sample must be performed very quickly to avoid the loss of volatiles. Once the soil sample has been added to the vial, the vial must not be reopened to add more sample. The preweighed vial must contain the preservative and a stir bar.

All low-level soil samples must be collected in duplicate to allow the laboratory an additional sample for reanalysis. The second soil sample must be collected from the same soil stratum or the same section of solid waste being sampled and within close proximity to the location from which the original sample was collected.

Additional samples must be collected for screening, dry weight determination, and high concentration analysis (if necessary) without the preservative. If high concentration samples are collected in vials containing methanol, an additional sample should be collected for screening and dry weight determination in a vial without preservative.

The laboratory performing the analysis needs to be contacted prior to sample collection to ensure that all necessary containers (with or without preservative) are available and that the proper sampling technique is used. Options for sample collection appear below:

Option 1 - Encore

- 1) Core with the Encore™ device in the field.
- 2) Collect two Encore™ samples/sample location*.
*Shipment required day of collection.
- 3) Collect one glass container (2 oz.) with septum lid for the high level and to determine moisture content.
- 4) Collect one headspace vial for screening.
- 5) Laboratory preservation/preparation within 48 hours of collection for the Encore™ samples and high level samples.

Option 2 - Low-level Vials

- 1) Core and weigh samples in field. (Balance required).
- 2) Collect two low-level vials (preserved or unpreserved*). Vials must be obtained from the laboratory performing the analysis.
*Shipment required day of collection.
- 3) Collect one glass container (2 oz.) with septum lid for high level and moisture determination. High level sample must be transferred to methanol within 48 hours of collection or the high level sample can be collected in methanol.
- 4) Collect one headspace vial for screening.

Option 3 - Field Screening

- 1) Field Screening.
- 2) Core and weigh in field.
- 3) Collect 2 low-level vials (preserved or unpreserved*)
*Shipment required day of collection.
Or
One high-level vial.

Method 5035 Sample Preservation

Method 5035 addresses the preservation of the low concentration soil samples with sodium bisulfate to ensure a sample pH of # 2. If using option 2, two pre-weighed sample vials with the sodium bisulfate preservative solution must be obtained from the laboratory along with two pre-weighed sample vials with 5 mL of reagent grade water (used if vigorous effervescence). The laboratory will also provide a sample vial to check the reaction of the soil with the sodium bisulfate preservative solution. Soil samples that contain carbonate minerals (limestone) may effervesce upon contact with the acidic preservative solution in the low-level concentration sample vial. If the amount of gas generated is very small, any loss of volatiles as a result of such effervescence may be minimal, if the vial is sealed quickly. If at all possible the sample must be preserved. A test sample should be collected, added to a vial with the preservative and checked for effervescence. If a rapid or vigorous reaction occurs, discard the sample and collect low concentration samples in vials that do not contain the preservative solution, but contain 5 mL of reagent water. Soil samples with no preservative must

be analyzed within 48 hours of collection or frozen within 48 hours of collection. Records must be maintained on the chain-of-custody documenting the necessary actions taken by the laboratory.

Soil samples for volatile analysis that are preserved with the sodium bisulfate preservative solution are to be cooled to approximately 4°C, packed in appropriate containers, and shipped to the laboratory on ice. These are to be analyzed within 14 days of sample collection. Samples receiving no preservation other than cooling to 4°C must be shipped to the laboratory the same day that they are collected. Once

in the laboratory, the samples must be analyzed or frozen within 48 hours of sample collection. The sample storage area must be free of organic solvent vapors. All samples need to be analyzed as soon as practical, but within the designated holding time of 14 days from sample collection for preserved samples or 48 hours for unpreserved samples.

Analytical Methodology

Tables 3 and 4 address the analytical methodology approved for the analysis of groundwater and soil samples pertaining to gasoline, diesel, fuel oil, and kerosene. Tables 5 and 6 address the analytical methodology approved for the analysis of groundwater and soil samples pertaining to waste oil. Table 4 addresses the analytical methodology approved for the soil leachability model. Other sample extraction procedures can be used provided the laboratory has the necessary certification.

Sample screening needs to be performed by the laboratory to determine the appropriate sample preparation procedure for the particular sample, such as the low-concentration closed-system direct purge-and-trap method, the high concentration method, or the nonaqueous liquid (oily waste) methanol or PEG dilution procedure. Calibration standards used for instrument calibration must also contain approximately the same amount of sodium bisulfate preservative as the sample, as the presence of preservative may affect the purging efficiencies of the analytes. If sodium bisulfate preservative is not used for the samples, then the standards used for instrument calibration must also not contain sodium bisulfate. Therefore laboratories will possibly have two different calibration curves for soil analysis. Analysis records must document the referenced calibration curve used for the quantitation of sample results.

Chain-of-Custody and Sample Analysis Documentation

Soil and groundwater samples collected for petroleum related sites must be handled in a manner that is consistent with the analytical testing and that preserves the integrity of the sample. All environmental sample results submitted to the Department for work performed at these sites must include adequate documentation of proper sample collection and analysis. The details of soil collection must be documented on the laboratory chain-of-custody form, field notes, laboratory results, and/or the environmental report. Sufficient details should be included to address collection and preservation methods employed in the field and in the laboratory. The Responsible Party (RP), usually the tank owner or operator, must ensure that the environmental laboratory under contract gathers this information. The RP is also responsible for ensuring that the laboratory is certified for the analyses in question and that this information is submitted to the

Department with the sample results.

The following must be included in the documentation submitted to the Department:

- 1) South Carolina Laboratory Identification Number: This number is assigned to a laboratory once it is granted certification by the South Carolina Department of Health and Environmental Control. **Certification is granted on an analyte-by-analyte basis; therefore, it is imperative that the laboratory's certification status for a particular analyte or method be verified through the Department (Call 803-935-7025).** Analyses performed by a laboratory without certification for the analyte or method will not be accepted by the Department.
- 2) Sample type, description, location, and UST Program Facility ID number: Describe the sample (soil, groundwater, surface water, etc.) and the location where the sample was collected. The field/laboratory identification must clearly correlate the sample with sample locations shown on a map.
- 3) Type of sample preservation: Indicate type of sample preservation performed on the sample. The laboratory must verify preservation of the water and soil samples for volatile analyses.
- 4) Sample integrity upon receipt in the lab: Describe if the sample container was broken or cracked, if the sample cap was loose or poorly sealed (e.g. due to sediment on the cap threads), or if the sample integrity was otherwise questionable. For Method 5035, the laboratory is responsible for ensuring that these samples have been collected properly. Any discrepancies must be addressed on the chain-of custody form and on the sample results. Preservation steps taken by the laboratory must be sufficiently documented on the chain-of-custody form or laboratory record.
- 5) The temperature of the sample when received: If the sample was received in ice and solid ice is still present report the sample as "received on ice." Exact sample temperature need not be reported for samples received on ice. If the sample is cooled using "blue ice" packs or the ice used in shipping is melted, then the temperature of a "temperature blank" must be reported. If the ice used to ship the sample has melted the temperature of the melt water may be substituted for a temperature blank.
- 6) The analytical methods used to analyze the samples: When using an EPA method, specify the number and when analyzing for a specific petroleum product, list the petroleum product with the method for sample preparation or extraction and then list the determinative method. For example, BTEX in soil - EPA Method 5035/8260B.

Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).

- 7) Sample results: The analytical result should be reported in the appropriate units for the sample

matrix analyzed and corrected for any dilutions performed on the sample or extract. Report soil results as ug/kg or mg/kg on a dry-weight basis with percent moisture and groundwater results as ug/L or mg/L. For each result reported, indicate any dilutions performed on the sample or extract. If the specified action levels for particular contaminants can not be achieved due to matrix interferences, the laboratory must explain what steps were taken to overcome these interferences. The laboratory can use antifoam reagents and appropriate cleanup procedures to eliminate these matrix interferences.

- 8) Laboratory reporting limit: The laboratory's reporting limit for the specific method or analyte must be indicated with the analytical result. The reporting limit is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard. This is the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point.
- 9) Method Detection Limit: The laboratory's method detection limit for the specific method or analyte must be indicated with the analytical result. The method detection limit is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero as determined by a specific laboratory method (40 CFR Part 136, Appendix B).
- 10) Surrogate recovery data: Surrogate recovery data for each sample must be reported for each organic determinative method employed.
- 11) Date and time sampled, received, extracted and analyzed: The sample data sheets must include the date and time the sample was collected, date and time the sample was extracted by the lab, and date and time the sample analysis was completed. The date and time the sample was received in the lab must be included on the chain-of-custody. For EPA Method 5035, if using the EncoreTM sampling device, the laboratory must also document the date of transfer from the sampling device to the analysis vial and storage conditions. If the date of analysis is past the acceptable holding time, the lab needs to ask for a resample to avoid rejection of results by the Department.
- 12) Product type identification: If a product type identification is made for a petroleum hydrocarbon, it needs to be identified and quantitated. Other helpful information such as the type of site or the results of field screenings are to be reported.
- 13) Flagged data: Any questionable data is to be flagged (such as exceeding holding times, improper sample collection, QC requirement failures, instrument failure during analysis, improper preservation of sample, or any other relevant factors).
- 14) Sample odor: Any obvious sample odor must be reported.
- 15) Unidentified but detected contaminants: Any detected but unidentified contaminants or peaks must be reported.

Complete chain-of-custody must be maintained for all samples when results are to be reported to SCDHEC. Chain-of-custody documentation must be submitted with the analytical results.

If you have questions concerning the methodology requirements and/or questions concerning a laboratory's certification status, please contact the Office of Environmental Laboratory Certification of SCDHEC at 803-935-7025.

If you have questions or would like a copy of the South Carolina UST Control Regulations or other UST related documents, please contact the Division of Underground Storage Tank Management at (803) 898-4350, FAX (803) 898-4330.

Table 1
Required Containers, Preservation Techniques, Holding Times
Ground-Water Samples¹

Contaminant	Container ²	Preservation ³	Holding Time ⁴
Purgeable Aromatic (BTEx, MTBE, EDB, and Naphthalene)	2 X 40-mL glass vials Teflon-lined septum caps	Cool 4°C 0.008% Na ₂ S ₂ O ₃ ⁵ H ₂ SO ₄ , HCl, or solid NaHSO ₄ to pH 2	14 Days
Polynuclear Aromatic Hydrocarbons (PAH)	Amber glass container with Teflon-lined lid	Cool 4°C	7 Days until extraction; 40 days after extraction
Total Petroleum Hydrocarbons (TPH) Waste Oil	G	Cool 4°C H ₂ SO ₄ or HCl to pH 2	28 days
Total Petroleum Hydrocarbons (TPH) (High Boiling Point Fuels)	Amber glass container with Teflon-lined lid	Cool 4°C	7 Days until extraction; 40 days after extraction
Dissolved Oxygen	G, bottle and top	None Required	Analyze Immediately ⁶
Ferrous Iron	G	None Required	Analyze Immediately ⁶
Nitrate	P,G	Cool 4°C	48 hours
Sulfate	P, G	Cool 4°C	28 days
Total Organic Carbon	P, G	Cool 4°C H ₂ SO ₄ or HCl to pH 2	28 days
Mercury	P,G	HNO ₃ to pH<2	28 Days
Metals (except Mercury) ⁷	P,G	HNO ₃ to pH<2	6 Months

¹ SW846, Third Edition, Updates I, II, and IIA, and III, Table 4-1 Sample Containers, Preservation, Techniques, and Holding Times. 40 CFR Part 136, Table II, Required Containers, Preservation Techniques, and Holding Times.

² Polyethylene (P) or Glass (G).

³ Sample preservation must be performed immediately after sample collection.

⁴ Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.

⁵ Should only be used in the presence of residual chlorine.

⁶ Samples must be analyzed in the field at the time of collection.

⁷ Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).

Table 2
Required Containers, Preservation Techniques, Holding Times
Soil Samples¹

Contaminant	Container ²	Preservation ³	Holding Time ⁴
Purgeable Aromatic (BTEX, MTBE, and Naphthalene)	Method 5035; 2 X 40-mL glass vials with septum and stirring bars	See Method 5035 Cool 4°C	14 Days
Total Petroleum Hydrocarbons (TPH) Waste Oil	G	Cool 4°C	28 Days
Polynuclear Aromatic Hydrocarbons (PAH)	Amber glass container with Teflon-lined lid	Cool 4°C Store in dark	14 Days until extraction; 40 days after extraction
Total Petroleum Hydrocarbons (TPH) (High Boiling Point Fuels)	Amber glass container with Teflon-lined lid	Cool 4°C	14 Days until extraction; 40 days after extraction
Mercury	P,G	None	28 Days
Metals (except Mercury)	P,G	None	6 Months
Total Organic Carbon (TOC)	P,G	Cool 4°C	28 days

¹ SW846, Third Edition, Updates I, II, IIA, and III, Table 4-1 Sample Containers, Preservation, Techniques, and Holding Times.

² Polyethylene (P) or Glass (G).

³ Sample preservation must be performed immediately after sample collection.

⁴ Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid.

⁵ Should only be used in the presence of residual chlorine.

Table 3
Analytical Methodology for Ground-Water Samples
Gasoline, Diesel, Fuel Oil, Kerosene

Contaminant	Analytical Method	Reference
Purgeable Aromatics (BTEX, MTBE, EDB, and Naphthalene)	EPA Method 5030B with EPA Method 8021B or EPA Method 8260B	SW846 ¹
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3510C ⁴ with EPA Method 8100 or EPA Method 8270C or EPA Method 8310C	SW846 ¹
Dissolved Oxygen	SM4500-O G	Standard Methods ²
Ferrous Iron	SM3500-Fe D	Standard Methods ²
Lead ³	EPA Method 7421	SW846 ¹
Nitrate	EPA Method 9056 EPA Method 9210	SW846 ¹
Sulfate	EPA Method 9056 EPA Method 9038	SW846 ¹
Total Organic Carbon (TOC)	EPA Method 9060	SW846 ¹

¹ SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

² *Standard Methods for the Examination of Water and Wastewater*, 18th edition, 1992, American Public Health Association.

³ Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).

⁴ Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.

Table 4
Analytical Methodology for Soil Samples
Gasoline, Diesel, Fuel Oil, Kerosene

Contaminant	Analytical Method	Reference
Purgeable Aromatics (BTEX and Naphthalene)	EPA Method 5035 with EPA Method 8021B or EPA Method 8260B	SW846 ¹
Total Petroleum Hydrocarbons ² (TPH) - DROs	EPA Method 3550B ³ with EPA Method 8015B	SW846 ¹
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3550B ³ with EPA Method 8100 or EPA Method 8270C or EPA Method 8310	SW846 ¹
Lead	EPA Method 7421	SW846 ¹
Total Organic Carbon (TOC)	EPA Method 9060	SW846 ¹

¹ SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

² Used for Soil Leachability Model only.

³ Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.

Other Analyses - Soil Leachability Model

In addition to the analyses above, collect one soil sample from the soil boring with the highest organic vapor measurement and analyze it for Total Petroleum Hydrocarbons by EPA Method 3550B/8015B.

Table 5
Analytical Methodology for Ground-Water Samples
Waste Oil

Contaminant	Analytical Method	Reference
Purgeable Aromatics (BTEX and Naphthalene)	EPA Method 5030B with EPA Method 8021B or EPA Method 8260B	SW846 ¹
Total Petroleum Hydrocarbons (Waste Oil)	EPA Method 9070 with silica gel cleanup	SW846 ¹
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3510C ³ with EPA Method 8100 or EPA Method 8270C or EPA Method 8310	SW846 ¹
Nitrate	EPA Method 9056 EPA Method 9210	SW846 ¹
Sulfate	EPA Method 9056 EPA Method 9038	SW846 ¹
Total Organic Carbon	EPA Method 9060	SW846 ¹
Dissolved Oxygen	SM4500-O G	Standard Methods ²
Ferrous Iron	SM3500-Fe D	Standard Methods ²
Lead (<5.0 ug/L) ³	EPA Method 7421	SW846 ¹
Mercury (<0.2 ug/L)	EPA Method 7470A	SW846 ¹
Trace Metals: ⁴ Arsenic (<5 ug/L) Barium (<50 ug/L) Cadmium (<0.1 ug/L) Chromium (<5 ug/L) Selenium (<5 ug/L) Silver (<5 ug/L)	EPA Method 7060A EPA Method 6010B EPA Method 7131A EPA Method 7191 EPA Method 7740 EPA Method 7761	SW846 ¹

¹ SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

² *Standard Methods for the Examination of Water and Wastewater*, 18th edition, 1992, American Public Health Association.

³ Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.

⁴ Initial lead or other RCRA metal samples should not be filtered. If elevated levels of metals are detected, the UST project manager will direct the number and type of additional metal samples (filtered lead, organic lead).

Table 6
Analytical Methodology for Soil Samples/Oil Samples
Waste Oil

Contaminant	Analytical Method	Reference
Purgeable Aromatics (BTEX and Naphthalene)	EPA Method 5035 with EPA Method 8021B or EPA Method 8260B	SW846 ¹
Total Petroleum Hydrocarbons (Waste Oil)	EPA Method 9071A with silica gel cleanup	SW846 ¹
Polynuclear Aromatic Hydrocarbons (PAH)	EPA Method 3550B ² with EPA Method 8100 or EPA Method 8270C or EPA Method 8310	SW846 ¹
Total Organic Carbon (TOC)	EPA Method 9060	SW846 ¹
Mercury (<10ug/kg)	EPA Method 7471A	SW846 ¹
Trace Metals: Arsenic (<0.25 mg/kg) Barium (<2.5 mg/kg) Cadmium (<0.5 mg/kg) Chromium (<0.25 mg/kg) Lead (0.25 mg/kg) Selenium (0.25 mg/kg) Silver (0.25mg/kg)	EPA Method 7060A EPA Method 6010B EPA Method 7131A EPA Method 7191 EPA Method 7421 EPA Method 7740 EPA Method 7761	SW846 ¹

¹ SW-846-3rd Edition, Updates I, II, IIA, and III, Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods. Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

² Other extractions methods may be used if the laboratory is certified for the extraction and determinative method.

